SGA GREEN SECTION

RECORD

A publication on Turfgrass Management May-June 2005

PETE COOKINGHAM

2005 USGA Green Section Award Recipient

Contents

May-June 2005 Volume 43, Number 3

Cover Photo
The 2005 USGA Green Section Award was presented to Pete Cookingham for his dedication to making the Turfgrass Information File a reality.

COVER PHOTO: © USGA/JOHN MUMMERT

2005 GREEN SECTION EDUCATION CONFERENCE

For the Good of the Game

February 11, 2005 • Orlando, Florida

For the 24th consecutive year the annual Green Section Education Conference was held in conjunction with the Golf Industry Show. This year, more than 1,000 people attended the Green Section's program on Friday, February 11, at the Orange County Convention Center. David Oatis, director of the USGA Green Section's Northeast Region, served as moderator for the morning's program of 11 speakers who addressed this year's theme, "For the Good of the Game."

COOKING THE BOOKS

Pete Cookingham awarded 2005 USGA Green Section honors.

For 20 years, Pete Cookingham has guided the development and expansion of the largest collection of turfgrass literature in the world.

Peter O. Cookingham, project manager of the Turfgrass Information Center at Michigan State University Libraries, received the United States Golf Association's 2005 Green Section Award. The award was presented by Bruce Richards, a member of the USGA Executive Committee and chairman of the USGA Green Section Committee, at the Golf Industry Show on February 11, 2005, in Orlando, Florida.

The USGA Green Section Award is given annually by a distinguished panel of experts in the turfgrass field and recognizes persons for distinguished contributions to golf through work with turfgrass.

Pete has expertise in both library science and recreation and park administration. He is a 1974 graduate of the University of Wyoming with a B.S. in recreation and park administration. After serving two years in the Peace Corps in South Africa, he returned to Wyoming to complete a Master's degree in recreation and park administration in 1979, and he earned a Master's in library and information science from the University of Illinois in 1985. He joined the Michigan State University Libraries in 1985.

For 20 years, Cookingham has guided the development and expansion of the largest collection of turfgrass literature in the world. As the librarian at Michigan State University Libraries, he has been instrumental in building and overseeing the Turfgrass Information Center (TIC), which houses more than 100,000 accessions covering all aspects of turfgrass research, science, and culture. Included in the collection are more than 80 years of USGA Green Section publica-

tions and 20+ years of USGA-sponsored turfgrass research. This sophisticated system provides computer access to important information for golf superintendents, scientists, practitioners, and students around the world.

The Turfgrass Information File, often referred to as TGIF, is fundamentally about optimizing the use of one of turf's great legacies — its literature — and making it available to the public at large. The TGIF has four primary functions:

- Locate, collect, and preserve published and unpublished materials relating to turfgrass science, culture, and management of facilities such as golf courses, parks, sports fields, lawns, sod farms, roadsides, institutional grounds, and other managed landscapes;
- Create an online index and abstracts of the materials;
- Streamline online access to the collection; and
- Support turfgrass scholarship with both physical and electronic infrastructure.

Widely admired and respected by turfgrass scholars and practitioners who routinely turn to him for information-gathering assistance, Pete goes the extra mile to assist those with special needs with calm perseverance and a positive attitude. In accepting the award, he commented, "For me, there can be no higher honor than being recognized by one's users. I am so humbled by this award, and I only hope that I can continue to be of service to you all, for the good of the game."

In accepting the award, Pete acknowledged the Michigan State University personnel involved in TGIF, and he made a point of recognizing some of the key individuals who helped guide the advancement of TGIF through its critical development years: the O.J. Noer Foundation for getting the ball rolling and continuing its involvement; Bill Bengeyfield, then national director of the USGA Green Section; and Dr. Jim Watson and Dr. Paul Rieke, members of the USGA Research Committee, for having the vision to recognize the potential and need for such a database and the perseverance to stay the course through both the good and rough times; Dr. Jim and Harriett Beard for their career-long scholarly pursuit of turfgrass literature; and individuals such as Danny Quast, Bill Middleton, and many others who stepped in at critical junctures in the development life of TGIF.

The USGA has been a longtime proponent of turfgrass research and an ardent supporter of the Turfgrass Information File. Pete Cookingham has made this dream a reality.

Pete Cookingham, 2005 USGA Green Section Award recipient.

USGA staff members (left to right) Jim Moore, Jim Snow, Pete Cookingham, Kimberly Erusha, and Mike Kenna have long been involved on the Turfgrass Information File advisory committee.

Golf's Environmental Message: Old News or New?

Now is not the time to be complacent with golf's environmental issues.

BY KIMBERLY S. ERUSHA, MATT NELSON, AND DAVE WIENECKE

"Golf courses are good for the environment." "Golf's guide to environmental stewardship." "Environmental commitment on the golf course." How many times have you heard these types of statements over the past 15 years? Be that as it may, environmental awareness and activism is not old news; it will remain a core issue for the golf industry for decades to come.

Safeguarding environmental quality should continue to be a primary goal of the golf industry. Yet, too often, Green Section staff members hear golf course officials and staff comment, "We're doing all of that" or "It's time to move on to a new issue" or "I'm tired of hearing about IPM." More subtly, they watch a person's eyes glaze over at the mention of environmental issues. Although research studies demonstrate that proper turfgrass management does not threaten environmental quality, as an industry we cannot afford to claim victory too early. Without due diligence when making day-to-day management decisions and continually communicating the responsible efforts taken to care for the environment, the golf industry is only one misapplication away from receiving a black eye and finding itself scrambling to improve its environmental image yet again.

Pesticide and water issues alone should be enough motivation to convince superintendents and course officials that the golf industry needs to remain actively involved in environmental stewardship. These topics will loom on the horizon for many years. Several communities throughout the United States and beyond are lobbying for the elimination of all synthetic pesticide and fertilizer use on turf areas, including golf courses. In 2002, the Supreme Court of Canada ruled that municipalities were allowed to ban the use of lawn pesticides. In 2004, legislation in Suffolk County, N.Y., proposed to ban the cosmetic use of pesticides by homeowners and lawn care operators.

Effective January 1, 2005, Madison, Wis., and Dane County (Wis.) enacted legislation stating that "no person shall apply any lawn fertilizer within Dane County that is labeled as containing more than 0% phosphorus or other compound containing phosphorus." This ordinance applies to golf courses and all other turfgrass areas. Similar legislation was enacted in Minnesota in 2005. While phosphorus may be applied when the need is demonstrated by a soil test, there is some concern about the precedent set by this legislation. Animated debates continue as lawn care operators and golf course managers cope with fertilizer- and pesticide-banning legislation.

Water quantity and quality have been prevalent problems in the Southwest for many years. Other parts of the country experience similar situations when faced with periodic droughts. In 2002, the Denver area experienced a significant water shortage due to an extended drought, and irrigation water for golf courses was completely cut off at city-operated facilities. Golf courses responded to the challenge by reducing water usage by 11% and increasing their use of recycled water.

Water consumption and pesticide usage will surely gain more attention and discussion in the future. The question that comes to mind then is, "What does the golf industry need to do to better address these issues?"

OLD NEWS

"The environmental message is old news." There is no time like the present to get used to the idea of environmental quality on golf courses. Environmental issues are here to stay, and the Green Section staff agrees that we are only getting started with the critical debates. Issues such as biological controls, wildlife habitat, pesticide exposure, and others are going to accelerate in the not-so-distant future. The industry needs to follow and understand local environmental policy. This means paying attention to issues impacting your community and being discussed at your city or environmental commission meetings. Be aware of the people in your community who are involved with environmental policy, including elected officials. Take the time to introduce yourself and maintain contact with them so that they feel comfortable contacting you with questions about your industry and vice versa.

Consider the actions of the Wisconsin Golf Course Superintendents Association. In February 2005 the association, along with other green industry partners in the state, took part in a "Day on the Hill." After a training session on how to properly present their information, golf course superintendents met with state legislators to discuss the size and impact of the green industry on the state's economy and their proactive concern for the environment. Similarly,

the Cactus and Pine Golf Course Superintendents Association (Arizona) and the Golf Course Superintendents Association of Southern California have had encouraging results with their lobbying efforts.

When you hear of impending legislation in your local community, do not assume that the golf industry is aware of it. Raise the topic at your local golf association or chapter meeting. Contact the GCSAA to make them aware of the issue. Participate in pertinent town meetings so that the discussion is based on factual information about golf course maintenance practices. Be prepared with facts about your own facility. Designate a committee of golf course superintendents within your local association who will coordinate the activities in your area. This group will be critical in keeping the golf industry aware of environmental issues and, when necessary, *rallying the troops* when the need arises.

Eastern Long Island, N.Y., golf course superintendents accepted the challenge from the U.S. Environmental Protection Agency in the fall of 2004 to protect the health of the local Peconic Estuary and other water bodies on eastern Long Island. Mike Rewinski, golf course superintendent at Westhampton Country Club, became part of the citizens advisory committee working on this issue. He rallied golf course superintendents to participate, and nearly 90% of the area golf courses agreed to reduce fertilizer use to limit the amount of nitrogen that enters the groundwater by developing comprehensive nitrogen management plans.

Fifteen California golf associations banded together to form the California Golf Alliance for Water in 2003. Their goal is to educate its members, lobby lawmakers, and influence public opinion about golf course water use. A USGA Regional Conference was held in 2004 with a similar idea, bringing together regulators and turfgrass managers to discuss water regulations and public perceptions of golf course water use.

Golf course superintendents are the front lines of communication with the golfing public. Take advantage of these interactions to positively influence a person's opinion about the golf industry.

Water quantity and water quality issues know no geographic boundaries. The southwest United States has faced a multi-year drought, and other parts of the country experience similar situations when faced with periodic droughts.

What is the condition of your golf course maintenance facility? The maintenance area holds the greatest potential for environmental degradation at a course, but a little common sense and a well-conceived plan can go a long way to provide excellent safeguards.

DOESN'T APPLY

"I'm doing things right on the golf course. That doesn't apply to me." Have you completed a *written* environmental plan for your golf course? It is fine to tell people that you do a significant amount for the environment while caring for the golf course, but the statement is much more powerful when it is documented in a written format. This "action form" gives your environmental plan greater value and allows it to be shown to anyone.

Do you need help in jump-starting your environmental plan? Audubon International's Cooperative Sanctuary Program is just a phone call away and will provide an outline of questions to get you started.

Is your maintenance facility, including the wash rack area, in order? Turf Advisory Service visits reveal that many golf courses don't pay enough attention to the maintenance area. There are numerous examples of wash rack areas that drain directly into water bodies, mix and load areas that are not properly contained, and fertilizer/pesticide storage areas that leave a lot to be desired. The maintenance facility arguably presents the greatest potential for environmental degradation at a golf course, but a little common sense and a well-conceived plan can provide excellent safeguards.

Do you have adequate buffer zones around your golf course water features? Buffers have a positive effect on filtering water, and the potential exists to remove 97-98% of sediments and chemicals in runoff, depending on the storm. That is not to say that runoff will not occur. University research (Oklahoma State University, University of Georgia, and University of Illinois) demonstrates that the amount of soil moisture present before the storm takes place has a significant impact on the amount of runoff. The golf course superintendent still needs to make responsible decisions as to what, how, and when a product is applied, regardless of buffer widths and composition. If soil is moist from a previous rain or irrigation and is then inundated by a two-inch-per-hour downpour, runoff will be produced, whether or not buffers are present, and pesticide or fertilizer applications should be avoided under these conditions. Established buffers, weather forecasting technology, and proper irrigation management can help limit offsite fertilizer or pesticide transport. A written plan helps ensure that the proper maintenance practices are followed and that a conscious commitment to environmental quality is made.

There can be complaints from golfers that higher mowed turf near the water's edge produces an unkempt look. Although there has not been a direct comparison between non-mowed and three-inch-tall turf buffers, there is good evidence that three-inch buffers can prevent almost as much sediment and chemicals from leaving the fairway in runoff water as unmowed buffers. The bottom line is that mow-low-to-the-edge-of-the-water is a risky scenario to follow. Marking the hazard boundary above the buffer is one way to help address playability concerns with the Rules of Golf.

These are just a few examples of how to get your course in order. If your own actions will not stand up to scrutiny, then it will reflect poorly on the industry as a whole.

ARE YOU COMMUNICATING CLEARLY?

Golf course superintendents are on the front line when it comes to communicating with the public about golf course management. Bruce Williams, CGCS at the Los Angeles Country Club (Los Angeles, Calif.), often challenges superintendents to have an *elevator speech* ready when those often-asked questions come up as to what your job entails. He defines this opportunity as approximately 30 to 45 seconds to get your message across, addressing not just who you are ("I take care of the golf course."), but taking it one step further in answering what you do and how you make life better on the golf course ("I'm responsible for the golf course turf and the surrounding environment. That includes making the golf course better each day for the golfers and also improving the environment for the wildlife that utilize the golf course.").

Most golf course superintendents are familiar with the questions that come up repetitively. For example, "What do you do for a living?" or "Don't golf courses use a lot of pesticides and water?" Develop and practice what you would say in response to commonly asked questions, and determine how you would give the questioner one point to think about after your conversation. Look upon these interactions as tremendous opportunities to positively influence a person's opinion about the golf course industry.

WORKING TOGETHER

The USGA is not letting its guard down regarding environmental issues. Over the past 20 years, we have dedicated significant time and resources focusing on the environment, and we continue to provide research grants that address environmental issues related to golf.

The responsibility is not the USGA's alone, however, and we need your help with this mission. If the golf industry wants to make headway on solving some of its environmental challenges and impacting the opinions of the critics, then that effort must take place on the grass-roots level. Each golf course superintendent has success stories, but time must be taken to document and share them with golfers and those outside the industry. Golf course superintendents are on the front lines every day, dealing with golfers, course officials, and local legislators. The environmental message of this industry does not need to be delivered in a grandiose public relations campaign. Progress is made by documenting and publicizing the good environmental deeds of individual golf courses as we strive to be a model industry for others to follow. The best campaign for golf's environmental message will be accomplished through the diligent and committed effort of everyone connected with this industry, one person at a time.

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The eastern Long Island, N.Y., golf course superintendents are working cooperatively with the U.S. Environmental Protection Agency to help reduce nitrogen impacts on the local Peconic Estuary and other water bodies on eastern Long Island. The golf courses have developed comprehensive nitrogen management plans and will participate in joint site visits conducted by Cornel University and the USGA.

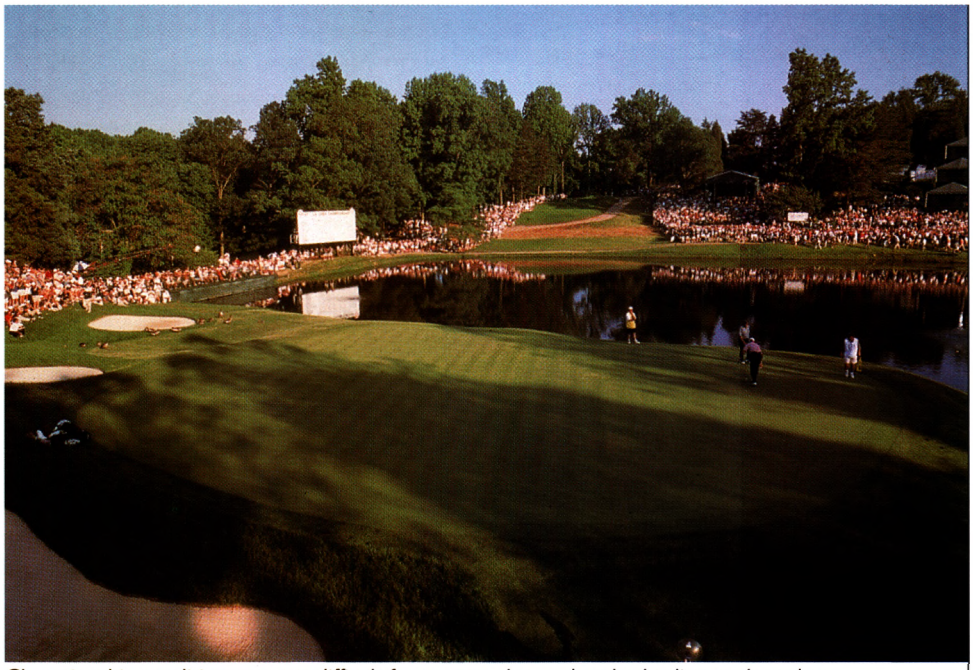
The following Long Island, N.Y., golf courses are participating in the U.S. Environmental Protection Agency Peconic Estuary Program. Working in conjunction with the EPA, Cornell University, the USGA, and New York State officials, the golf courses have pledged to reduce fertilizer use.

Atlantic Golf Club
Bridgehampton Club
Calverton LInks
Cedars Golf Course
East Hampton Golf Club
Fox Hill Golf & Country Club
Friar's Head
Gardiners Bay Country Club
Goat Hill at Shelter Island Country Club
Great Rock Golf Club
Hampton Hills Golf & Country Club
Indian Island Golf Course
Islands End Golf & Country Club
Laurel Links Country Club
Long Island Golf Club
Maidstone Club
Montauk Downs
National Golf Links of America
North Fork Country Club
Noyac Golf Club
Old Vine Country Club
Pine Hills Golf Club
Poxabogue Golf Course
Quogue Field Club
Rock Hill Golf & Country Club
Sag Harbor Golf Club
Southampton Golf Club
Shinnecock Hills Golf Club
South Fork Country Club
The Bridge
Westhampton Country Club

Where is Green Speed Taking the Game?

Are ultra-fast putting greens threatening to ruin the game we love?

BY MATT NELSON AND LARRY GILHULY



Championship conditions are too difficult for average, day-to-day play, leading to slow play and frustrated golfers.

A search for *green speed* in the Turfgrass Information File (TGIF) database at Michigan State University produces a count of 543 articles. A search of the *Green Section Record* reveals that green speed has been discussed in 75 articles since the 1920s. In both instances, more than 97% of these articles have been published since 1977, the year the Stimpmeter® was introduced. As a frequently discussed issue, speed is a relatively new phenomenon in golf's long and rich history.

A majority of the articles in turfgrass publications report on the short- and long-term consequences of turfgrass health when pursuing fast greens for an extended time period. It is well documented that low mowing, frequent grooming, and excessive rolling of putting surfaces can increase physiological stress in the turf, increase disease activity, promote weed invasion, and generally diminish the reliability of the turfgrass stand. When it comes to green committees, course officials, owners, and many golfers, these arguments concerning turf quality and sustainability often fall on deaf ears. Unrealistic comparisons between golf courses are commonly made, and it becomes the burden of the golf course superintendent to meet expectations, realistic or not.

The turfgrass industry itself has contributed greatly to the green speed debate. While on one hand agronomic problems relating to turfgrass performance and reliability are often pinned on the pursuit of increased ball roll, better mowers, improved plant protectant compounds, safer plant growth regulators, refined cultivation techniques, more sophisticated irrigation, increased superintendent training, and the advent of the information age have all enabled turgrass managers to achieve faster greens more safely. If you want your putting greens to roll 13 feet as measured by the Stimpmeter — we have the technology. Do you have the cash and the conviction to commit to the necessary programs? All of them?

The point of this article is not to debate the agronomic reality of maintaining consistently fast greens in any particular climate or location, but rather to draw attention to the playability concerns that arise from excessively fast greens. The authors have found that golfers are likely to accept playability issues as a reason to limit green speed, especially if a broad spectrum of the membership or clientele is apprised of the problems that fast greens can cause.

During the past 25 years or so since the advent of the Stimpmeter, green speeds have increased by about three to four feet at golf courses in the Pacific Northwest and intermountain regions of the U.S. This represents about a 50% increase in ball roll in this time period. These statistics are based on green speed readings taken during USGA Turfgrass Advisory Service visits from the late 1970s through the present. These numbers are real, not fictitious, despite the most keen memories of any longtime player. In fact, regular membership green speeds at many golf courses today exceed national championship green speeds of only 10 or 20 years ago. Interestingly, the average handicap of the American golfer is 16.1 for men and 29.2 for women.

Left: Smoother putting green surfaces should be the goal — not speed! Right: Many older golf greens were constructed with slopes too steep for the ultra-fast green speeds of today. In some cases, reconstruction is warranted, but slowing down the greens some is a lot less expensive and disruptive, and preserves the character and design integrity of the golf hole.

WHAT'S WRONG WITH FAST GREENS?

They slow down play! If any golfer goes through the same pre-shot routine with each putt, consider that it naturally takes longer to hit four putts than three. Fast greens make it increasingly difficult to stop a golf ball close to the hole, especially on longer putts and when contours are presented. Arguably, it is even more difficult to play delicate pitch shots from around greens and stop the ball near the hole (or even on the green), leading to slower play.

Slow play is regularly cited as a primary deterrent to golfer participation and is a major industry concern. Green speed doesn't have to be rolled back to the days when a putter required a little loft, but some measure of control will increase enjoyment for the majority of players while keeping them moving along.

Interesting hole locations are lost. As greens become faster, certain portions of putting greens are no longer acceptable for a fair hole location. No one likes to see a missed putt roll back or a well-struck putt roll completely off a green when missing the hole. Even subtle contours can become unacceptable when green speeds are too fast, and this compromises the original strategy and design intent of many great golf greens and also results in limited setup possibilities. Some wonderful old golf greens now have only two or three good hole locations because of the demand for excessive green speed. Setup becomes stale, and much of the fun and excitement of the golf course is lost.

Another worrisome trend at present is the reconstruction of many challenging and interesting older golf greens to accommodate modern green speeds. In some cases such renovation is completely valid and supported, but at least as many more would be better served by moderating speed and enjoying the dynamics of the design. New putting green design is limited as compared to older golf courses with surface contours and corresponding approach shot value and variability.

Ball marks and old holes are slower to heal. With less grass on greens to cushion the blow from incoming shots and less leaf area to fix energy for recovery, it is no wonder ball marks are a problem of epidemic proportion at busy facilities. Golfers can appreciate problems with ball marks when they contribute to missing an easy five-footer, and even those ball marks that are properly repaired are slow to heal because of the aforementioned limitations in turfgrass canopy.

A much tighter margin of error with plug replacement of old holes results from closer and closer mowing. Mechanical injury to the grass in the summer months usually requires several weeks or more to heal, and if a green has become limited to only two or three areas for hole locations, these concentrated plugs become an eyesore, and putting quality is compromised.

Golf course setup is for a minority of players. The setup of golf courses with very fast greens caters to the minority of golfers who are the best players. As mentioned above, chip shots and longer putts are almost impossible for the average player, thereby diminishing the fun factor and slowing the pace of play. Golf is an extremely difficult game for the overwhelming majority of players and does not need to be even more frustrating.

Fast greens put the emphasis on "championship" rather than "fun." Increasing fun and decreasing frustration would seem to be a logical approach to growing the game of golf. So many golf courses today are striving to provide so-called "championship" conditions on the putting greens every day, rather than considering fun and enjoyable golf for all players. Better drivers, irons, and golf balls are all marketed to make it easier to hit it like the pros and with greater replication. Even if it does not improve scoring, most golfers like to hit the ball a little better. The same argument can be made for putting green conditioning — most golfers want to see the ball go in the hole. The emphasis should be on smooth and true surfaces that promote good ball roll and fun golf, not excessive speed that tortures

Playability concerns arise from excessively fast greens. This situation is a four-putt waiting to happen.

the average golfer for just a slight mistake. Do you really think golf is more fun and exciting to play now than it was 20, 40, 60, or even 100 or more years ago? It is still the same game of strategy, three-dimensional positioning, and skill played outdoors with the same basic set of rules. Are we having more fun than our predecessors did?

And what about that poor turf? Turf problems are sure to arise when your expectations exceed your means with respect to maintaining fast green speeds. Moss, anthracnose, drought stress, traffic, winterkill, and many other turf maladies become magnified by the pursuit of faster and faster greens. Combating these problems requires greater inputs, involving costs that are ultimately passed along to the golfer. It costs more money to maintain faster greens, and increased green fees and/or dues are not likely to cause more people to flock to the game.

This leads us to the unmistakable conclusion . . . that the main emphasis for putting green surface conditioning should be on smooth and enjoyable, not excessively fast. A better pace of play will be realized by most golfers. Setup variability will remain exciting and intriguing, and not merely predictable. Older golf courses can enjoy their classic architecture without being forced into unnecessary or compromising renovation. Surface quality will remain more consistent throughout the year, with fewer inputs required and better ball mark repair — cost savings that can be passed on to golfers. Moderate green speeds also provide a setup more favorable to golfers of differing ability, from novice to expert, and keep the focus of golf on fun.

The next generation of bragging rights at golf courses will not be how fast the greens are, but how good they are. The ultimate challenge will be maintaining smooth and consistent surfaces at a pace that promotes the best golf at a particular golf course. This goal will require skilled maintenance and an understanding and appreciation of the game of golf and related playability to match design. We have proven we can maintain greens that are too fast, even for the very best players in the world. The horticultural Holy Grail must now be replaced with an appreciation of good golf, which may even involve using the Stimpmeter as it was originally intended, as a gauge of consistency from green to green. It is time to get off the road of faster greens and get on the one that leads to good golf for all players, for the good of the game.

MATT NELSON, *agronomist, and* LARRY GILHULY, *director, represent the USGA Green Section's Northwest Region.*

Distance Control, The Game We Love, and the USGA

Many eyes are on the ball and equipment in hopes of preserving the game of golf.

BY FRED RIDLEY

The USGA remains committed to efforts to build the body of knowledge about golf equipment and the golf ball.

I have a unique perspective of the GCSAA, having chaired the USGA Championship Committee for four years. One thing that sticks in my mind about being in charge inside the ropes at our championships, particularly the U.S. Open, is the way in which superintendents from the best clubs and courses around the country volunteer their time to assist the USGA in presenting championship courses to the best players in the world. It was not unusual to see a superintendent from a past or future U.S. Open site mowing greens or raking bunkers.

In my remarks at the February 2005 USGA Annual Meeting, I outlined the USGA's priorities for the year ahead.

- We will recommit ourselves to hosting the best and most significant championships in golf.
- We will undertake an initiative to grow the USGA membership to at least one million by the end of 2007.
- We will establish, build, and grow partnerships with other stakeholders in the game of golf.
- We will continue our efforts to build our body of knowledge about golf equipment and, in particular, the golf ball, with the single purpose of being thoughtful, well-informed rulemakers.

The people involved and the range of issues are very complex regarding equipment matters. There are no simple answers. The debate about distance, and in particular the distance the best players in the world are now hitting the golf ball, is not new. It has been constant for more than 100 years. The USGA believes it is important that the major constituencies in the game be well informed.

The USGA's Equipment Standards Committee regulates clubs, balls, and other equipment to assure compliance with the Rules of Golf. We regulate not just for the most accomplished golfers, but for all golfers of all abilities. The underlying philosophy is to assure that skill — not technology — remains the dominant factor in playing golf.

This philosophy is set forth, in detail, in the Joint Statement of Principles adopted by the USGA and the Royal & Ancient Golf Club of St. Andrews (R&A) in 2002. Prior to the Statement of Principles, there was a sharp division

Carter Rich, manager of USGA equipment rulings, does field testing at the U.S. Open to measure players' carry and drive distances.

in the golf world on the issue of spring-like effect. That and other equipment-related issues were impacted because the USGA had used outdated equipment and, frankly, we were not anticipating change very effectively. We have come a long way since those days.

The USGA is fortunate to have a group of very talented employees who devote themselves to the USGA's role of establishing equipment standards for all golfers. Dick Rugge, USGA senior technical director, oversees a staff of 18 at the USGA headquarters in Far Hills, N.J. Housed within the USGA Technical Center is an impressive array of test and research equipment, including an indoor test range, Iron Byron, and other space-age technology.

Many of the accomplishments of the Equipment Standards Committee and the USGA technical staff do not generate headlines, but nevertheless they reflect significant steps in understanding and regulating the equipment all golfers use.

During 2004, the USGA implemented a new method of measuring spring-like effect in drivers and other clubs, utilizing a pendulum tester developed by the technical staffs of the USGA and R&A. That pendulum tester is simpler to use, features more reproducible test results, and is capable of being used in the field. Manufacturers and the golf tours have accepted it. According to some club manufacturers, the pendulum tester also has proven itself to be an important tool in club-head development.

Simplified putter "plain in shape" interpretations were implemented by the USGA that are easier for everyone to understand and apply. They make it easier to evaluate conformance. This is just one step in our efforts to simplify our rules wherever possible.

Improved backspin measurement methodology, together with our ball research project, provides new insights into how technology is changing the way the game of golf is played.

These procedures have significant effects on the way manufacturers produce and market their clubs. In response to those needs, we have reduced the average time to decide whether a submitted club conforms with the Rules of Golf from 60 days to 20 days. Manufacturers have been cooperative with the USGA in carrying out our equipment-related responsibilities. While we do not always agree with each other, there are frank and candid exchanges of information and ideas that are good for everyone involved.

With regard to the golf ball, during 2004, the indoor test range was fully implemented, allowing testing year round, with better-controlled conditions and more reproducible results. We also have made significant progress on our ball research project, about which I will say more in a minute.

Other research efforts have been aimed at better understanding how technology affects the way the game is played, especially at the highest levels. For example, swing speed and launch conditions of all tour pros at the 2004 U.S. Open were measured. Matt Pringle, USGA senior research engineer, has been developing a turf-impact tester for use on fairways and greens, to better understand the effects of course setup on player performance. We hope to refine the tester this year and to use it to generate more data at our championship sites.

Of course, the issue that continues to generate more discussion than any other topic regarding technology and the game of golf is the distance elite players hit the golf ball. In that regard, let me summarize what we know and how this knowledge has brought the USGA and the game to where we are.

The average driving distance on the PGA Tour increased 10% or 26 yards from 1993 to 2003

(260 yards to 286 yards). This increase was due to several factors: higher spring effect in drivers; larger clubheads with larger sweet spots; more forgiving clubs that allow the accomplished players to swing harder; higher swing speeds due primarily to increased athleticism but also to longer, lighter clubs; development of balls with lower spin rates and improved aerodynamic properties; and use of advanced launch monitors to match clubs, shafts, and balls to an individual player's swing.

In recognition of these increases and these factors, in May 2002 the USGA and the R&A adopted a Statement of Principles. By adopting the Statement, the USGA and the R&A agreed that:

- Any further significant increases in distance at the highest level are undesirable.
- Factors contributing to distance would be considered on a regular basis, and
- If such increases occur — whether from technology, athleticism, improved coaching, course conditioning, or a combination of these factors — the organizations would immediately seek ways to protect the game.

It is significant that, after careful study, the PGA Tour adopted a similiar statement in 2003.

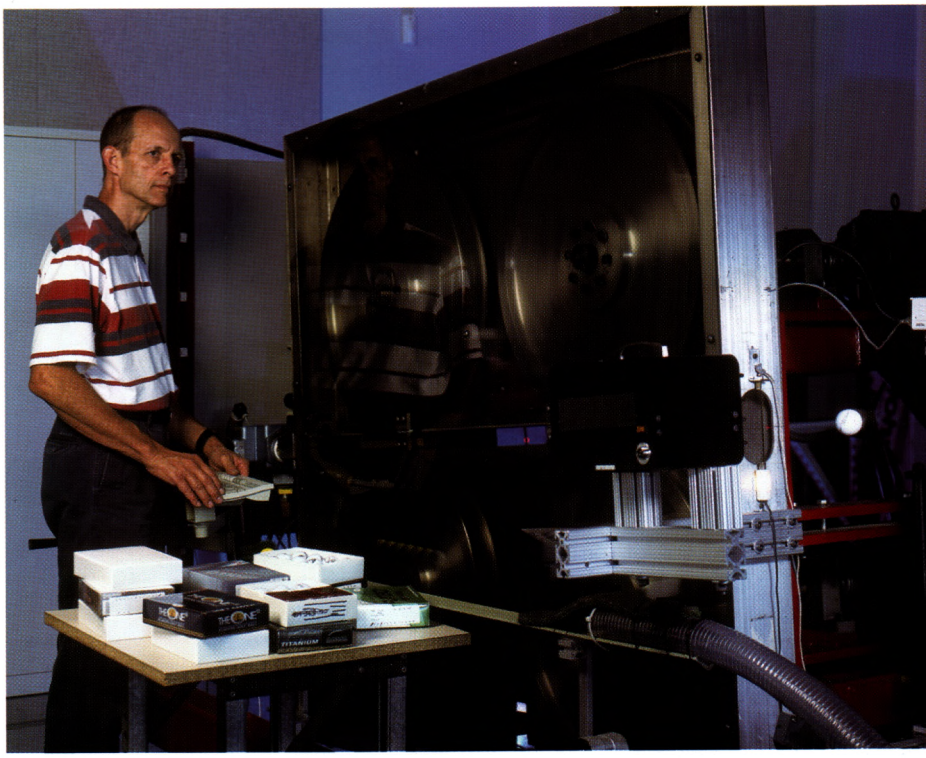
A number of things have already been done by the USGA and the R&A to rein in any further increases in distance. What we have been able to accomplish is due in large part to the cooperation between the R&A and the USGA and to the considerable time and money invested by both organizations. We hope to continue to work closely to accomplish our mutual goal of effective and responsible regulation.

We have witnessed an unprecedented series of advances in golf technology from the manufacturers in a relatively short time. In response, the USGA and the R&A over the last six or seven years have taken more steps to control the effects of technology on the game than were necessary in the preceding 100 years. For example, we adopted a limit on:

- Spring-like effect, and then developed a new pendulum test device and procedure.
- Clubhead size, including dimensional limitations.
- Shaft length (48 inches).

We implemented a new Overall Distance Standard that included updating our test protocol to utilize current club technology and to reflect the clubhead speed of today's accomplished players. As part of the new testing procedures, we implemented an indoor test range, with more consistent and reproducible results.

We also realized that if we are going to continue to be truly effective regulators, we need to learn a lot more about golf ball performance. In 2002, the USGA committed the funds necessary to conduct advanced research on all aspects of the golf ball. The goal is to learn as much as possible about the ball and its performance characteristics: size, weight, materials, construction, dimple design, impact dynamics, aerodynamics, and moment of inertia.



The USGA's indoor test range is used to determine whether or not a golf ball conforms to the USGA Overall Distance Standard.

We are not in the business of research for the sake of research, however. The ultimate goal is to determine how performance might best be regulated if it is determined to be necessary under the Statement of Principles. In that regard, we believe that we have developed industry-leading modeling techniques and are on the cutting edge in our understanding of ball performance characteristics.

We plan to largely complete the project in 2005. We would then be in a position to formulate any possible rule change based on science, not opinion, and we would have a thorough understanding of how the change would affect players of all abilities. Anything less would be irresponsible rule making.

The PGA Tour has been supportive of these efforts and has repeatedly acknowledged that the

USGA and the R&A are the appropriate rule-making bodies for regulating golf equipment. They have publicly supported the research efforts, particularly the ball project, and have recognized that it is only through that research that we can define what options are available to regulate distance and make educated assessments of the effects of those options. They also have given us full access to the data generated by their new ShotLink System for every shot at every tour event. As a result, we have a far clearer picture of how the game is being played by the best players. Actual data have replaced speculation and opinion because of ShotLink.

Several notable people, well respected in the game, have expressed opinions about increasing distance. The debate about distance is not new. Many golf writings dating back at least to Bernard Darwin in the early part of the last century have been a part of that debate.

The USGA welcomes and listens to all input, and our position remains consistent. We will continue the ball research program to be prepared in the event changes become necessary in the future. We will act based on facts rather than opinions. We will follow the Statement of Principles adopted in 2002. While at the present time there is no consideration by the USGA of a rollback of the golf ball, a rollback could happen in the future if there are more changes to the game and we gain a better understanding from reliable scientific data as to the options for how that best could be accomplished.

The Equipment Standards Committee has set an aggressive agenda for 2005. We believe it accurately reflects the state of the industry and the game. I hope to be able to report next year at this time that 2005 was another year of accomplishments: That we have continued to simplify our rules, anticipated new techological advances and acted appropriately, that we have an even better understanding of how technology has changed the way golf is played and why, and that we are ready to implement a rule change on golf ball distance if it is ever decided that such a change is necessary. If made, such a decision will be based on our Statement of Principles, good science, and input from others who have a stake in the game.

FRED RIDLEY *was named president of the USGA in 2004.*

Natural Organic Fertilizer Considerations

Making superintendents better consumers.

BY STANLEY J. ZONTEK, PATRICK O'BRIEN, BOB BRAME, AND JIM SKORULSKI

Motherhood, apple pie, and the American flag generate warm, fuzzy feelings for most Americans. Concepts like keeping the golf course firm, dry, and fast convey similar feelings to golfers. For turf managers, it's solid management, using only enough water, fertilizer, and plant protectant chemicals to grow healthy grass. There are no arguments to any of these points. The same "good feelings" are often extended to using natural organic byproducts on golf courses.

Ash is the residual material left over after the organic matter is combusted or burned off as carbon dioxide. This material may have the potential to add extra fines in the upper soil profile, contributing to decreased infiltration.

Turf managers have many options for fertilizing their turf. One of these options is the use of "natural organic" fertilizers. Unfortunately, not all natural organic (NO) fertilizers are the same. Much has been written and discussed within the industry about these products, and many turf managers get a good feeling about using them. After all, aren't they good for the environment? Aren't they a good way to use up all those abundant byproducts of our society? Don't they help discourage disease? Don't they help build up the beneficial microbes and organic content of soils, especially those (perceived) sterile soils used in green construction? Isn't using these products . . . well . . . good? The answer to all these questions is "yes and no."

Here is our disclaimer. It is important to state that these are not bad products. That said, they are not wonder products. They have their strengths and weaknesses, just as any category of products does. The purpose of this presentation is to make golf course superintendents *better consumers*. That is, to ask the right questions about the NO products used on the golf course in general and on putting greens in particular.

THE ORGANIC MYTH

Keep in mind the fallacy, or myth, of organic nitrogen. To the grass plant, it does not matter where the nitrogen comes from. The plant cannot distinguish (or use) organic or inorganic nitrogen differently. In fact, nitrogen can be taken up by the grass plant *only* in an *inorganic* form. This occurs when the soil microbes transform organic forms of nitrogen into the inorganic form the grass plant can use.

Thus, these NO products are used for reasons other than to provide a "better form of nitrogen" to the grass plant. As stated above (and as common sense would suggest), not all natural organic products are the same. Far from it. Among other things, one aspect of these products that makes them different from each other is their mineral or ash contents. The table below shows some significant differences between three commonly used (and for the purpose of this presentation, unnamed) NO fertilizers in one very important area of concern: their ash content.

ASH TEST ANALYSIS[1]

Product[2]	*Percent Ash*
Natural Organic Product A	50.8%
Natural Organic Product B	35.1%
Natural Organic Product C	26.0%

[1]Analysis by Dr. Andy McNitt, Penn State University

[2]Random samples collected from superintendents' stocks

WHAT IS ASH?

As defined by Dr. Bob Carrow, University of Georgia, "Ash is any inorganic mineral attached to any organic material. This could include sand, silt, clay (and clay binders), and nutrient salts." Ash is the residual after the organic matter is combusted or burned off as carbon dioxide. It is not that "inorganic" is in itself a problem. Nutrient salts are inorganic and can test as ash. What can

be a concern is the accumulation of extra ash, extra fines, in the upper profile of a putting green, posing potential consequences for the turf manager. Sand-based rootzones can accumulate silt and other fines from wind, flooding, topdressing material, and other means. The overuse of these NO products could be one avenue where this process is accelerated.

Today we are using denser turfgrasses on our greens, be they bentgrass, bermudagrass, or even paspalums. Also, the older and more open grasses are being dwarfed, made denser, by the use of growth regulators. Extra ash in a fertilizer can only aggravate an all-too-common concern in the upper profile of a green — too much density, too much "stuff" that holds water, shortens roots, encourages moss and algae, etc.

Let's do some quick math. Let's assume that a hypothetical natural organic fertilizer contains, as an extreme, 50 percent ash and has a nitrogen content of 5 percent. When a fertilizer of this analysis is applied at a rate of 1 lb. of actual nitrogen per 1,000 sq. ft., 20 lb. of NO fertilizer is applied per 1,000 sq. ft. This equates to 10 lb. of mineral ash, or "stuff," per 1,000 sq. ft. True, 5 percent of this mineral content could be the fertilizer salts, but the rest is ash. This may be cause for concern when a turf manager applies 2 lb. of nitrogen per year as a NO fertilizer, since 20 lb. of ash (fines and fertilizer salts) is also being applied. This could be a red flag or, at best, a yellow flag.

Excess ash can exacerbate all sorts of problems that already exist in the upper profile of a putting green. Such a green may be under-aerated and under-topdressed, and where excess moisture exists through irrigation or rainfall, problems can develop. When the sealing-off of the surface of a green occurs, extra work is needed to aerate the plugged zone, remove the cores, and topdress to fill the holes and ultimately to dilute the zone of fine particles, regardless of where they originated. Therefore, our suggestion is that these

While a certain amount of organic matter accumulates, the organic/thatch interface of this 10+-year-old putting green looks questionable.

NO products can and perhaps should be used in moderation and only after the superintendent knows more about the physical characteristics of the NO fertilizer being used.

GENERAL USAGE GUIDELINES

- As a general rule of thumb, the best release rates from these products tend to occur in mid to late spring and early fall. While many of these fertilizers do contain quick-release nitrogen, some of the nitrogen is also slow-release, requiring microbes to break down the nutrients into a plant-usable form. A general guideline suggests that for every 18°F temperature rise between 32°F to 95°F, soil microorganism activity increases by 1.5 to 3.0 fold; thus, nitrogen release from organic sources in the hot, humid summer months can be much more rapid. Microbes need good soil aeration to work.
- Summer usage can increase algae and result in maximum NO fertilizer release rates. This could be either good or bad. It depends on what the turf manager wants. After all, it is during these conditions when the microbes that release the nutrients should be most active. This can result in a difficult-to-predict release curve. Increasingly, superintendents are relying on soluble, spoon-feeding programs to maintain turf at this time of the year. The bottom line is that when soil temperatures are less than 55°F, these fertilizers tend to exhibit slow release rates. When soil temperatures are above 80°F, release can be rapid.
- Soil pH levels below 5.5 can affect release curves because of lower microbial activity.

ENVIRONMENTAL BENEFITS

- ***New golf course construction.*** Natural organic fertilizers (and composts) incorporated into new soils can be beneficial. In fact, in the USGA Green Section's *Tips for Success* publication, part of the pre-plant fertility in new construction is recommended to be from a natural organic fertilizer.
- ***Recycling.*** Golf courses are wonderful sites to utilize and recycle byproduct materials, be they wastewater, natural organic fertilizers, and composts.
- ***High bulk and micronutrients.*** These low analysis products allow the turf manager to spread low rates of nitrogen as a granular fertilizer, also containing a long list of micronutrients.

CONCLUDING THOUGHTS

- Do not confuse natural organic fertilizers with composts. They are different. Natural organics generally have higher nutrient contents that are listed on the label as fertilizer and, thus, must meet fertilizer laws regulating nutrient content claims. Composts do not claim a specific nutrient content and are usually added to a soil to enhance organic matter content rather than serve as a fertilizer.
- Develop a buyer's checklist. What are the strengths and weaknesses of the products available to you? The informa-

tion will help determine when and where to use these materials to their best advantage.

- Cost per pound of nitrogen. The nitrogen contained in natural organic fertilizers can be very expensive. Price it out.
- Review the expected release curves for any fertilizer product you plan to use, including NO fertilizers. Which product is right for your need? Be sure to use those products at the right time of the year to accent their strengths and negate their weaknesses.
- If you are committed to using large amounts of composts and natural organic products, adjust your golf course maintenance and management programs to mitigate concerns about the potential "fines," the ash, they may contain. Some additional aeration and topdressing will have to be scheduled through the year.
- Research is unclear on whether or not NO fertilizers suppress disease. One study showed that some products *reduced* the number of *S. homoeocarpa* (dollar spot) infection centers for two consecutive years, some products had no effect, and some fertilizers used in these tests resulted in an *increase* in dollar spot infection centers. Literature reviews are full of these contradictions. Clearly, general claims for disease suppression may vary from product to product due to the wide range of different natural organic products available to our industry.
- As Dr. Frank Rossi stated in his article from the September/October 2004 issue of the USGA *Green Section Record*, "There are no silver bullets" and "superintendents need to spend more time learning basic science." He is right. When in doubt, always ask questions, be it of your regional USGA Green Section agronomists or scientists from state land-grant universities. Unbiased opinions along with applicable research are the foundation of the USGA Green Section and state university research and extension programs.

The purpose of this article is to help golf course superintendents be better consumers. Natural organic fertilizers have been part of our industry for decades. These products provide the turf manager with a low-analysis, easy-to-spread, environmentally sound material that can be used for all sorts of reasons, from supplying the grass with micronutrient-rich, low-nitrogen-analysis fertilizers . . . to melting ice and snow! Nevertheless, know the strengths and compensate for the weaknesses of any NO products that you use on your course. Where a possible concern exists, either use these products in moderation or on areas of the golf course where their possible weaknesses are of less concern. In other words, be a *better consumer*!

Topdressing remains one of the most effective putting green maintenance operations, both for better putting surfaces and for managing organic accumulations.

STANLEY J. ZONTEK *is director of the USGA Green Section's Mid-Atlantic Region,* PATRICK O'BRIEN *is director of the Southeast Region,* BOB BRAME *is director of the North-Central Region, and* JIM SKORULSKI *is senior agronomist in the Northeast Region.*

Strategies for Organic Matter Control

Using scientific and empirical approaches for managing organic matter accumulation can be frustrating.

BY PAUL VERMEULEN AND CHRIS HARTWIGER

Few things in golf are more annoying than putting greens with too much organic matter accumulation. For golfers, the putting surface is degraded by footprinting, excessive ball marks, and inconsistent ball roll. For superintendents, the turf is more prone to disease and insect activity, development of hydrophobic conditions, and mower scalping. On the opposite end of the scale, putting greens with too little organic matter accumulation have poor sod strength and little resilience to incoming shots.

Being that either too much or too little organic matter accumulation is problematic, the question that begs to be answered is, "How much organic matter is just right?" In the practice of golf course management, there are two common approaches to finding the right answer to this question. There is the scientific approach, involving the review of pertinent university studies, and the empirical approach, involving field observation.

A review of university studies and relevant magazine articles indeed suggests that organic matter content can be quantified as a percentage by weight and that this information can be useful for making management decisions as well as monitoring accumulation over time. The rub is that the recommendations for optimum organic matter content set forth by scientists range from 1.5% to as much as 8%.

To appreciate the differences between varying organic matter values, one can look at the many different ways samples are taken in the field and subsequently analyzed by laboratory personnel. In research studies, some scientists prefer to take samples from the upper 25 centimeters of a soil profile and include the turf on top. Others take samples as deep as 35 centimeters and remove the verdure. Because deeper samples contain a greater volume of soil relative to organic matter, the latter studies tend to suggest lower organic matter measurements.

To reduce excessive accumulations of organic matter in putting greens, many superintendents apply a large volume of topdressing material following core aerification.

When superintendents want to determine the organic matter content of their putting greens, some submit an intact, 6-inch-deep turf plug to a physical soil testing laboratory that dissects it into layers upon receipt. Others have their soil samples collected between a .25-inch and 4-inch depth and tested for organic matter content at the same time they are being analyzed for nutrient status. Not only is the sampling protocol different from that typically used in research studies, but different laboratories use different testing procedures for determining organic matter content. Such discrepancies in sampling and laboratory testing can produce radically different results for superintendents with essentially identical circumstances. Further, their results are difficult, if not impossible, to correlate with research studies.

In a perfect world, the turfgrass industry would use uniform sampling and testing protocols for organic matter content that take into account quality as well as quantity. Because idealized protocols have yet to be agreed upon by all parties concerned, the practical message here is that one should only compare notes with others using the same methods of sample collection and laboratory processing.

Another interesting point to consider is that research studies have yet to show a conclusive link between imminent turf failure and a specific value for organic matter content. Current research studies suggest that the potential for management difficulties increases across a range of organic matter measurements and other factors, such as climate, and can have an overshadowing effect. With this in mind, it would seem reasonable to correlate organic matter test results with turf quality and performance during stressful environmental conditions to determine if there is a need for changing an otherwise successful maintenance program.

To make an empirical attempt at answering the question of how much organic matter is just right, each Green

Section office surveyed ten or more superintendents who manage high-quality putting surfaces in their region. The purpose of this survey was to look at current efforts to manage organic matter accumulation through the application of topdressing material on the putting surface and in the open voids created by aeration practices. In addition, the survey was designed to identify possible regional trends, such as a gradual increase in topdressing usage from north to south and east to west coinciding with the overall length of the growing season. By focusing on topdressing, the survey assumed that organic matter content decreases and the benefits thereof increase as the annual rate of topdressing increases.

The results of the survey are tabulated in Table 1. The mean value represents the average annual rate of topdressing for courses surveyed by each office in each region. Intuitively, one's impulse is to view a survey mean as a benchmark of sorts. Further, values greater than the mean might be considered as being superior in some form or fashion. In this survey, however, the mean topdressing rate is intended to reflect a point of diminishing benefit or, more accurately, the amount of topdressing material that is required to manage organic matter accumulation at a level that is just right.

Unfortunately, to make the conclusion that the mean topdressing rate reflects the amount of material required to precisely manage organic matter accumulation, the range and standard deviation for the survey data would have to be much smaller than the values shown in this survey. In other words, if superintendents have a sixth sense for an organic matter content that is just right, then the survey data should have revealed a stronger consensus in topdressing usage among superintendents at well-maintained courses in close proximity to one another. The data from most regions in this survey, however, almost seem to suggest that well-maintained courses in close proximity to one another apply topdressing material for the purpose of managing organic matter without recognizing a rate of diminishing benefit.

For example, in the Mid-Continent Region's Carrollton, Texas, office, the mean and standard deviation are 37.1 and 9.1, respectively. The high standard deviation basically tells us that the majority of the surveyed courses use anywhere between 28 and 46.2 cu. ft. per 1,000 sq. ft. per year of topdressing material during an entire growing season. This equates to a difference of more than 100 tons of topdressing material between courses that have approximately 130,000 sq. ft. of putting surface.

Given the broad distribution of data found in this survey, it would also be premature to use it for gauging regional topdressing recommendations. As a case in point, there is almost a two-fold difference in the mean topdressing rate for the two halves of the Mid-Atlantic Region. If the data were used as a foundation for making recommendations, should the higher or the lower value be used?

If there is a strong conclusion to be made from the survey, it is probably that it generates multiple questions regarding current industry practices and suggests the need to conduct further research. For starters, perhaps a straightforward experiment can be conducted using varying topdressing rates that could ultimately serve as a foundation for making regional recommendations.

All superintendents know that diluting organic matter accumulation with topdressing material delivers playability and agronomic benefits. Nevertheless, answering the simple question of what is the right amount of organic matter has proven to be elusive. Maybe it's because the question is not as simple as we would all like to think.

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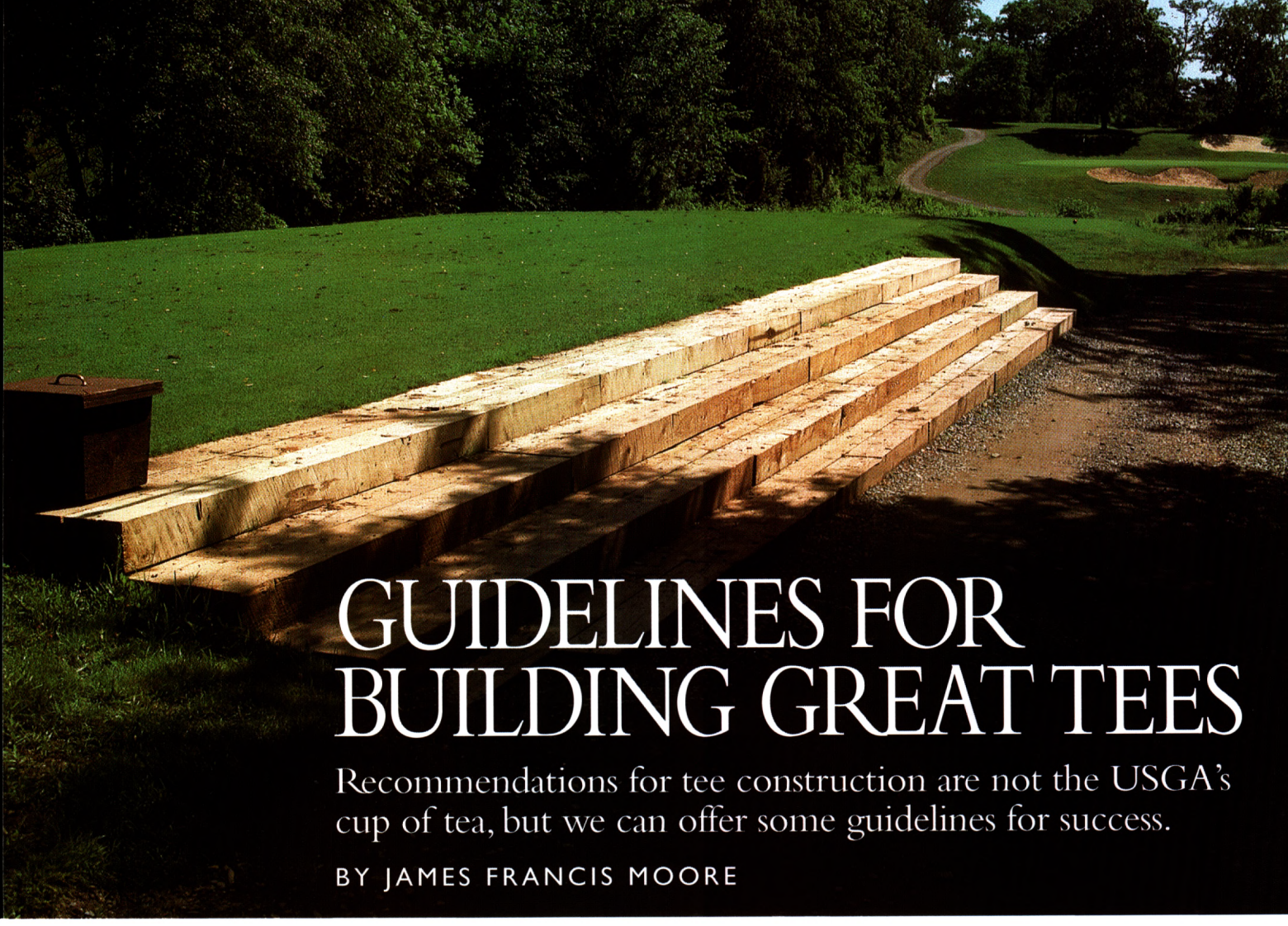
Table 1

Topdressing survey results for ten or more well-maintained golf courses within each Green Section office's region.

Green Section Office	Topdressing Rate (ft^3/1,000 ft^2/yr)		
	Mean	Range	Standard Deviation
Cool-Season Turfgrass			
Mid-Atlantic — Glen Mills, Pa.	16.0	7.5 - 26.3	6.7
Mid-Atlantic — Pittsburgh, Pa.	27.1	14.5 - 51.1	11.1
Mid-Continent — Carrollton, Texas	37.1	21.8 - 52.5	9.1
Mid-Continent — White Heath, Ill.	20.7	15.8 - 30.6	4.5
North-Central — Covington, Ky.	18.5	8.3 - 25.4	7.6
North-Central — Elm Grove, Wis.	20.7	8.4 - 34.5	8.2
Northeast — Palmer, Mass., and Easton, Pa.	20.3	12.0 - 51.7	8.8
Northwest — Gig Harbor, Wash.	31.6	22.5 - 39.4	5.8
Northwest — Twin Falls, Idaho	24.7	5.3 - 43.1	11.5
Southeast — Griffin, Ga.	34.3	14.6 - 65.5	14.3
Southwest — Santa Ana, Calif.	37.9	10.7 - 70.3	23.8
Warm-Season Turgrass			
Florida — Hobe Sound, Fla.	44.3	17.4 - 101.7	28.2
Florida — Rotonda West, Fla.	90.2	62.9 - 147.6	36.6
Mid-Continent — Carrollton, Texas	38.0	22.3 - 85.5	17.3
Southeast — Birmingham, Ala.	38.2	17.1 - 85.5	22.5
Southwest — Santa Ana, Calif.	24.1	11.4 - 33.7	12.0



GUIDELINES FOR BUILDING GREAT TEES

Recommendations for tee construction are not the USGA's cup of tea, but we can offer some guidelines for success.

BY JAMES FRANCIS MOORE

Tees should have multiple entrance and exit points so that traffic is not concentrated in a small area. This tee corrected the traffic problem by constructing a large stair area to disperse foot traffic.

Green Section agronomists are often asked why the USGA doesn't provide specifications for the construction of tees. Although many articles have appeared in the *Green Section Record* discussing various aspects of tee maintenance, few have addressed tee construction directly. As most are aware, we have provided very detailed recommendations for putting green construction for more than 40 years, so it would seem reasonable to expect the USGA to follow a similar format for tees as well as bunkers and other facets of golf course construction.

To better understand why we have been reluctant to write guidelines for tee construction, a brief semantics lesson is in order. There is a very large difference in the meaning of the words *recommendations* and *specifications*. When it comes to the construction of greens, the USGA has long published the *USGA **Recommendations** for a Method of Putting Green Construction*. This document details what the USGA Green Section feels is the best way to build greens. When these *recommendations* are referenced in a contract as the construction method to be followed, they become contract *specifications*.

When it comes to greens, the USGA feels very strongly that the *recommendations* should not be modified. On the other hand, it has been our experience that tee construction need not be so precise. The higher height of cut typically maintained on tees promotes much stronger turf that, in turn, is much more tolerant of less-than-ideal growing conditions. It is our belief that there are a lot of ways to build good tees. Publishing a single *recommendation*, which might in turn be utilized as a *specification*, could result in the elimination of many other valid tee construction methods that might be more economical for a particular project.

Our hesitation to publish a single recommended tee construction method does not prevent us from offering a number of guidelines that we feel will help ensure top-quality tees. The following suggestions should be incorporated into every tee construction project.

SIZE

No construction method will produce good turf if the tee is too small for the amount of play it receives. For many years, the Green Section agronomists have utilized a tried-and-true rule of thumb for tee size. For every 1,000 rounds of golf the tee receives each year, 100 square feet of usable teeing area should be provided. Thus, a tee that receives 20,000 rounds per year should be constructed to provide 2,000 square feet of usable area.

Note the phrase "usable area." Many tees meet the square footage requirement in terms of length by width, but some have much less usable area for a variety of reasons. The surface may be so unlevel that only a small portion of the tee is actually used by golfers. A large portion of the tee may go unused as a result of trees that encroach into the target line, forcing players to one side or the other. Shade from surrounding trees often results in turf that is so weak that a golfer cannot take a firm stance and thus will not use that area of the tee. It also should be kept in mind that any tee that receives heavy iron play must be significantly larger than the computed amount. The same typically is true for the number-one tee due to the additional practice swings it must endure.

Once again, this is only a rule of thumb. For a much more detailed discussion on how to determine proper tee size, refer to Paul Vermeulen's article entitled "Tailor-Made" in the March/April 2002 issue of the *Green Section Record*.

ACCESS

Tees should have multiple entrance and exit points so that traffic is not concentrated in small areas. Steps, planter boxes, cart path design, and severe slopes all can result in severe wear on tees in spite of the tee being of sufficient size. No amount of fertilizer, construction method, or turfgrass species can completely overcome heavy traffic concentrated in a small area. The problem is greatly exacerbated if the tee is shaded; limited light and heavy traffic guarantee weak turf.

SLOPES ON SIDES OF TEES

Tee banks or slopes can have a great impact on both maintenance and golfer safety. From a maintenance standpoint, steep slopes are difficult to water, fertilize, cultivate, and, most of all, mow. Mowing steep slopes frequently results in damage to the turf when the equipment struggles to maintain uniform traction. *Crabbing* is a term that describes the tendency of a mower to slip sideways as it travels perpendicularly to the slope. Whenever the drive wheels of a mower lose traction, they chew up the turf.

The same loss of traction results in a dangerous situation for equipment operators. This is particularly true for the drivers of spray equipment, due to the increased weight and load shifting of the tanks. To overcome such problems, many superintendents find the best option for maintaining steep tee banks is to forgo the use of large equipment and rely instead on costly hand labor.

Sands that contain some soil and organic matter are easier to maintain due to better water and nutrient retention. They also are more stable underfoot.

From the golfer's standpoint, the combination of steep tee slopes and spikeless shoes can result in slips and falls. This is particularly true anytime the grass is damp. In an effort to prevent injury and possible litigation, course operators often will build steps and ramps to provide a safer and less-strenuous climb to the teeing ground. Unfortunately, while such devices may help reduce the problems associated with the steep slope, they invariably concentrate traffic to a single entrance and exit point. As already noted, this concentration makes weak turf inevitable.

To avoid these problems, side slopes should be kept at 3:1 (18 degrees) or less.

LIGHT

Insufficient light, coupled with insufficient size, are the two most common problems with tees. The two factors are physiologically linked. Everyone remembers from grade school biology that green plants produce the energy necessary for growth through photosynthesis. To maintain a dense and attractive surface, the turfgrass on tees must grow faster than it is worn out. Tees that are too small for the traffic they receive cannot recover quickly enough. Turfgrass grown on tees that receive insufficient light grows much more slowly due to reduced photosynthetic activity. Predictably, small, shaded tees generally are found in extremely poor condition. It also should be remembered that the same trees that limit the light to a tee are often close enough to compete aggressively with the turf for nutrients and moisture.

The Green Section recommends that tees receive eight hours of direct sunlight per day. This does not mean that it is impossible to have a good teeing surface with less than eight hours of light. A large tee with multiple entrance and exit points and limited iron play can perform well with less than eight hours. Root pruning of the trees adjacent to the tee can make for an even more favorable growing environment. Turfgrass selection can make a tremendous difference. Bentgrasses and ryegrasses are far more shade tolerant than bermudagrasses. As a result, many southern courses find that the only time they have good turf on their shaded bermudagrass tees is when they are overseeded with ryegrass for winter play.

ROOTZONE SELECTION

Many different construction methods have proven successful for tees. There are examples of excellent tees being maintained with rootzones composed of mixtures of sand, soil, and organic matter. There are also good tees built from the material harvested from old greens when they are rebuilt, and even good tees built from straight sand. Predictably, each method has advantages and disadvantages.

An informal survey of the Green Section staff and many golf course superintendents revealed that most turfgrass managers would rather grow turf on tees that have a rootzone that includes some soil. Soil combined with sand and organic matter provides a stable surface with good nutrient and moisture retention while at the same time draining quickly enough to get the tee back into play in a reasonable amount of time following heavy rain. Rootzone mixes are expressed in ratios of sand to organic matter to soil, with the most popular being 7:2:1 or 8:1:1.

When a course decides to rebuild greens, it is a good idea to give strong consideration to overhauling the tees at the same time. Years of topdressing, aerification, and fertilization will almost certainly result in significant improvement in the upper few inches of rootzone of the old greens. As a result, in most instances, the rootzone material removed from the old greens will prove excellent for use on tees.

Straight sand is the easiest to build with, and it drains very rapidly. However, it provides the least favorable growing conditions in terms of moisture and nutrient retention. It also can be very unstable in terms of playability for months and possibly years. If straight sand is used, it is vital that the sand be submitted to an accredited soil-testing laboratory for analysis. The lab can perform tests to determine how deep the sand should be to ensure good drainage and improved moisture retention. They can also provide some insight into stability issues, although this is not an exact science.

SURFACE DRAINAGE

Regardless of the rootzone selected, every tee should be constructed with a minimum of 0.5% slope on the tee top to ensure surface drainage of excess water away from the teeing ground. Fortunately, such precise grading has been made much easier with the advent of laser grading equipment. As a general rule, the order of preference for the direction of the surface drainage is front to back, right to left, left to right, and back to front. In reality, few, if any, golfers can sense

such a small degree of slope and thus the primary determinant for the direction of surface drainage should be in which direction the water can be discharged most efficiently. To avoid creating slippery and unsafe conditions, consideration should be given to the entrance and exit points used by golfers. On connected, multiple-tiered tees, care must be taken to avoid sending surface water to the area between a forward and back tee. Doing so often results in water accumulating in the transition area between the two levels.

SUBSURFACE DRAINAGE

Every tee should also have subsurface drainage. Ideally, the subgrade of the tee should be shaped to direct excess water to a collection drain. A slope of 1.0% to 2.0% will ensure that water moves across the surface of the subgrade to the drain line. Water should not move more than 15 feet across the subgrade without being collected by a drain. A drain line should also be installed near the edge of the tee to prevent water that has moved across the subgrade from bleeding out of the tee bank and causing maintenance and safety problems.

ALIGNMENT

The alignment of rectangular tees with the target area is an issue that causes concern with many golfers. Based on personal observations, golfers have little problem lining up their shots when the tee is pointing well off the target line — greater than 10 degrees. Golfer complaints regarding this issue are most likely to occur when the tee is just slightly off line. This is likely more of an aesthetic issue than one of playability. Regardless, it is an issue with many players and can be addressed easily during construction.

CONCLUSION

In summary, while there are many ways to build good tees, the following points should be kept in mind to ensure a successful tee construction project.

- Adequately size the tee based on how much and what type of play it receives and the growing conditions of the site.
- Provide multiple access points to spread golfer traffic over as large an area as possible.
- Keep the slope of the tee sides at 3:1 (18 degrees) or less to provide safer conditions for players and course workers.

There is a lot right with this golf course tee, including plenty of light, unlimited access points, ease of maintenance, and alignment.

- The surface of the tee should receive a minimum of eight hours of direct sunlight per day.
- A 7:2:1 or 8:1:1 sand/organic matter/soil rootzone generally provides excellent growing properties.
- Provide surface drainage slope of at least 0.5% regardless of the composition of the rootzone.
- Slope the tee subgrade at least 1% to 2% to interception drains spaced no greater than 15 feet apart. Install a drain at the edge of the tee to prevent "bleeding."
- To avoid controversy regarding tee alignment, align rectangular tees directly with the target line or else angle them greater than 10 degrees away from the target line.

JIM MOORE *is the Green Section's construction education program director.*

Using Turfgrass and Environmental Research on the Internet

Accessing research results is just a click away.

BY MIKE KENNA

More than 20 years ago the USGA initiated a new turfgrass research program. Harry W. Easterly, Jr., the USGA senior executive director at the time, made the following statement: "We believe this will develop into one of our most important undertakings. In time, the research program developed by this Committee could lead to major breakthroughs in all phases of turfgrass maintenance . . . ."

Since the beginning of this research commitment in 1983, the USGA has provided $25 million to fund 290 research projects at 32 universities. There is a tremendous body of information contained within USGA publications and research reports generated by this program. In the Green Section Research office, I have what I call the million-dollar files, as the information in these files cost $25 million!

Since 2002, the Green Section has increased its efforts to make this information available to as many people as possible. For example, Turfgrass and Environmental Research Online (TERO) was created, and more than 60 research summary articles have been published to date. The goal is to publish a new article every two weeks. The *Green Section Record* has published 38 articles on USGA-sponsored research since January 2002. All of the USGA Annual Research reports since 1984 have been scanned and made available online, and more than 250 full research reports submitted to the USGA are available online today.

How do you get to this information from your location? This article will briefly review the steps to get you started.

TERO ARTICLES

TERO is an online service that provides the results of research projects funded through the USGA Turfgrass and Environmental Research Program. This free resource is located at http://usgatero.msu.edu. To browse TERO, first click on Browse TERO Articles and the list of articles will appear. The articles are sorted by their publication date, but you can also sort articles by *research area, workgroups,* or *specific area* of interest. *Specific area* is a sorting method you may find useful. Use the drop-down box under Current and Past Issues sorted by: and select *specific area*. Now, the articles will be sorted alphabetically by a keyword such as *amphibians, bentgrass, bermudagrass*, etc. Once an article is selected, Acrobat Reader® will load and a PDF version of the article will appear on your screen.

Each TERO article has a cover page and information about the research program and committee. Articles are usually 6 to 20 pages in length, and all have a short, bullet-point summary to provide a quick overview of the information. Articles include useful data, tables, graphs, or pictures to more effectively communicate the research results. All articles have a literature-cited section that, in most cases, is linked to a record in the Turfgrass Information File (TGIF) at Michigan State University libraries. You simply click on the TGIF record number to access all the information available on that particular publication. There also may be a link to the actual publication if you are interested in reading further.

TERO articles also can be searched using a *keyword*. First, click on the Search TERO Articles link on the left of the TERO Web site page. Use a single word or short phrase to find articles in which you are interested. For example, if you use *dead spot* as a search term, a total of four TERO articles will appear. Five of the articles have information on *spring dead spot* in bermudagrass, and one article is about *bentgrass dead spot*. The search feature works in a manner similar to many of the internet search engines.

USGA *GREEN SECTION RECORD*

You also can research the entire *Green Section Record* history. First, click on the USGA Green Section Record. The *Record* page has all of the issues, as well as the preceding Green Section periodicals that have been published since 1920. All of the issues are arranged by decade for easy browsing. Once a particular year is selected, the content of each issue for that year is arranged by the month it was published. Articles can also be searched by keyword. Click on Search the USGA Green Section Record on the *Record* page and type in a keyword or phrase. If your keyword produces too many articles, narrow it down by adding additional information. For example, the keyword *traffic*

will produce more than 100 links; however, if you use *putting green traffic*, the search will narrow considerably. You can read the article on your computer screen, print it out, or access the article in your back issues of the *Record* on your bookshelf.

OTHER USGA TECHNICAL AND RESEARCH PUBLICATIONS

Another source of information is Other USGA Technical and Research Publications found on TERO. Clicking on this title reveals a complete library of all the annual reports the USGA has published or received since 1983. On this page there are three types of reports, Executive Summaries, which are brief summaries; Research Summaries, which are one page in length; or Full Research Reports, which were submitted to the USGA by sponsored scientists and range between 10 and 20 pages in length.

Research Summaries generally provide the best information for use. The summaries are sorted by publication year and grouped within decades. For example, if you go to the 2003 summary, a table of contents with all of the reports for that year appears on your computer screen. These reports are one-page summaries that contain the research objectives, project description, progress for the year, and a short, bullet-point list of highlights located in the lower right corner of each report. If more information is needed about this research project, click on the right column of the table to call up the TGIF record for the report.

TURFGRASS INFORMATION CENTER WEBPAGE

The Turfgrass Information Center, or TIC, is housed at Michigan State University and can be selected from the TERO webpage. This database contains the largest collection of turfgrass literature available in the world. The USGA has made significant time and resources available in support of the TIC. All USGA publications are available free of charge.

Once on the TIC home page, you will see that there is an endowment campaign to make the Turfgrass Information File free of charge. Consider making a contribution to this important component of the turf industry. The TIC protects valuable publications about turfgrass in the O. J. Noer Memorial Turfgrass collection, and it recently worked closely with Dr. James B. and Harriet Beard to include what is generally acknowledged to be the finest personal collection of turfgrass research information in the world. In addition, there are many other services that the TIC offers to people in the industry who need information about turf.

These valuable resources are available to be used. They just might provide exactly what you are looking for!

MIKE KENNA, PH.D., *is director of the USGA Green Section Research Program.*

Alternative Grasses: Panacea or Problem?

Breeders and superintendents are still searching for the perfect turfgrass.

BY DARIN BEVARD, JOHN FOY, TODD LOWE, AND BUD WHITE

Any of us would appreciate it if our jobs were made easier. This is particularly true for golf course superintendents faced with rising expectations and fixed or reduced resources. Plant breeders assist turf managers by developing turfgrasses with improved quality, greater stress resistance, and reduced inputs. Turfgrass breeding programs have produced new grasses to choose from, but none of these grasses is bulletproof. This article discusses some of the benefits and challenges of managing these new, and increasingly popular, turfgrass varieties.

PUTTING GREENS — ULTRADWARF BERMUDAS, HIGH-DENSITY BENTS

Hybrid bermudagrass still reigns as the most popular grass in regions south of the transition zone. Tifdwarf bermudagrass was the standard for putting greens for nearly 30 years. Even today, it withstands a variety of mowing heights and provides good playing conditions for most golfers. A breakthrough occurred in the late 1990s with the introduction of ultradwarf bermudagrasses. With higher shoot densities and finer leaf texture than Tifdwarf bermudagrass, the ultradwarfs provide better overall quality. The National Turfgrass Evaluation Program (NTEP) ranked Mini-Verde, TifEagle, and Champion ultradwarf bermudagrasses better than Tifdwarf in turf quality over a three-year period ("Bentgrasses and Bermudagrasses for Today's Putting Greens," January/February 2003 *Green Section Record*).

High-density creeping bentgrasses have set a similar standard for putting green quality. Ironically, the quality of ultradwarfs has pushed bermudagrass greens further north, and the high-density bents have allowed high-quality creeping bentgrass greens to be maintained further south. Compared to other creeping bentgrasses, high-density bentgrasses tolerate heat and low mowing heights extremely well.

The newer putting green grasses accumulate thatch rapidly. Thatch management programs should be initiated at the time of grow-in and continue on a routine basis for the life of the green.

Ultradwarf bermudagrasses and high-density bentgrasses are becoming popular for golf course putting greens because they provide significantly better playing conditions than previous standards. Nevertheless, there are some concerns with these grasses.

- A faster rate of thatch accumulation requires adherence to good core aeration, sand topdressing, and light surface grooming programs to dilute thatch and organic matter. Thatch management should be initiated at the time of grow-in to prevent falling behind on these programs.
- These grasses can be maintained periodically at very low mowing heights, but they become stressed during periods of prolonged cloudy, hot, and humid weather. To help weather-proof putting greens, mowing heights must be raised incrementally through stressful periods. Putting greens become more susceptible to secondary pathogens during stressful periods under excessively low mowing heights, especially when undernourished.
- No putting green grasses can overcome limitations such as improper construction techniques (i.e., 100% sand rootzones, poor surface drainage), shade, or restricted air circulation. These newer grasses are no exception. Whether due to their density or other factors, high-density bentgrasses are particularly sensitive to poor air movement, perhaps more so than older bentgrasses. A proper growing environment is as critical with these grasses as any other.

Ultradwarf bermudagrasses and high-density bentgrasses have created a new standard for putting green turf. Many superintendents have learned how to manage these grasses successfully, but others have been less successful, and it is often due to the previously mentioned limitations. Neither grass will overcome unrealistic expectations, poor growing environments, or limitations due to improper construction techniques. Appropriate management decisions are still essential.

SEASHORE PASPALUM

Seashore paspalum is a salt-tolerant grass that has been around the golf course scene since the mid-'70s, but it was used only on a limited basis because of its inferior turf quality. This past

If managed properly, seashore paspalum can provide a good putting green and tight fairway lies.

decade has seen a major advancement in seashore paspalum development with the introduction of several fine-textured seashore paspalum varieties. With irrigation water quality and availability at the forefront, there will be increased use of alternative turfgrasses such as seashore paspalum. In addition to its ability to tolerate poor-quality irrigation water, there are other positive attributes of seashore paspalum:

- It can withstand a wide variety of mowing heights so that the same grass can be used on greens, tees, fairways, and roughs.
- It possesses a deep root system that can extract water from lower soil depths, even at low mowing heights (<0.125 inch).
- Seashore paspalum has improved tolerance to low light situations. Bermudagrass requires at least eight hours of full sunlight each day to maintain good quality turf, and it performs poorly in shaded areas or during cloudy weather. Seashore paspalum maintains good turf quality in these situations.
- Paspalum produces a very dense cover and tight canopy on tees, fairways, and roughs, allowing a golf ball to sit higher.
- It has improved cool-weather color retention. Bermudagrass turns off-color during periods of low soil temperatures and becomes completely dormant in regions with prolonged low soil temperatures. Seashore paspalum also becomes dormant in northern regions, but it maintains greener color than bermudagrass in southern regions.
- Mower striping patterns are more visible on seashore paspalum. Many golfers appreciate the aesthetic qualities that mowing patterns provide. In fact, some golf courses burn-in mowing patterns by continually mowing in the same direction. For whatever reason, mowing patterns are much more visible on seashore paspalum, creating visual stripes on the turf that golfers find attractive.

Seashore paspalum is still rather new to the golf course industry, but we have learned some of the common concerns about this turf. These include:

- Susceptibility to common turfgrass pests. Seashore paspalum is *not* more tolerant of army worms, plant-parasitic nematodes, or plant pathogens.
- Consistent smoothness and speed on putting greens. It is possible to provide acceptable putting green conditioning

for daily play, but arguably it does not perform as well as high-quality bermudagrass putting greens.

- Maintaining playing surfaces of mixed grasses (i.e., paspalum tees, fairways, or roughs and bermudagrass greens) is not recommended, as either grass is difficult to control with herbicides. Controlling paspalum in bermudagrass greens is just as difficult as controlling bermudagrass in paspalum tees, fairways, or roughs. The most effective control of either non-desired grass is physical removal/replacement.
- Paspalum has accelerated thatch accumulation due to its highly rhizomatous growth character. This can cause

Recent advances in seeded zoysiagrass offer hope for more affordable establishment of this grass. Most zoysiagrass establishment is still accomplished through strip or solid sodding, which comes at a high cost.

mower scalping, which can be slow to recover.

- Seashore paspalum leaves and stems are more robust, placing a premium on sharp mowers and routine equipment maintenance.
- High mowing heights are not recommended, as the turf becomes too penal and unsightly. Roughs should be maintained at less than 1.5 inches. This decreases the penalty for hitting off-line, since the ball sits up on seashore paspalum at this height.

ZOYSIAGRASS

Zoysiagrass also provides a good option for fairways. It is well adapted for the transition zone and is often considered as a potential alternative to bermudagrass or cool-season fairway grasses. Establishment costs for vegetative zoysiagrass are a concern, although options for seeded zoysiagrass are improving rapidly. Advantages of zoysiagrass include:

- Exhibits excellent density. Where a clean, tight lie is desired, zoysiagrass fits the bill. The ball lie on zoysiagrass during the dormancy period is exceptional, too.
- Tolerates shade better than bermudagrass and has excellent drought and cold tolerance. Zoysia performs well in the transition zone under a variety of weather conditions.
- Seeded varieties, while not yet used extensively, are showing promise as an alternative to the high cost of establishing zoysiagrass from sod. Time will tell if the seeded zoysiagrasses are a comparable alternative to vegetative varieties on golf courses, but early results suggest seeded varieties may become popular.

As with the other grasses mentioned, there are maintenance challenges that come with zoysiagrass.

- Zoysiagrass appearance during dormancy is offensive to many golfers, in spite of excellent dormant playability. Right or wrong, golf is a green world, and zoysiagrass cannot be overseeded. Overseeding causes rapid decline of zoysiagrass populations. Dormant zoysia fairways can be painted green, but this is not the same as green grass.
- Zoysiagrass requires fungicide treatments to control zoysia patch. This can come at a significant cost.
- Mower maintenance is higher with zoysiagrass. Compared to bermudagrass, the stiff leaf blades place greater demands on mowing equipment and the mechanics who maintain the quality of cut.
- Zoysia requires exceptional drainage to be its best. The tight mat layer at the surface can hold water, resulting in wetter fairways. In some instances, there has been a push to cap fairways with 6 to 8 inches of sand to promote better fairway drainage.

SUMMARY

Although there are no perfect grasses, there are several options for golf courses to choose from. Who knows? Perhaps tomorrow's researchers will develop turfgrasses that can survive a multitude of stresses and provide excellent quality with minimal inputs. Until then, we have to provide the best quality with what we have, and USGA agronomists will continue to report successful agronomic programs as well as important issues with these new grasses.

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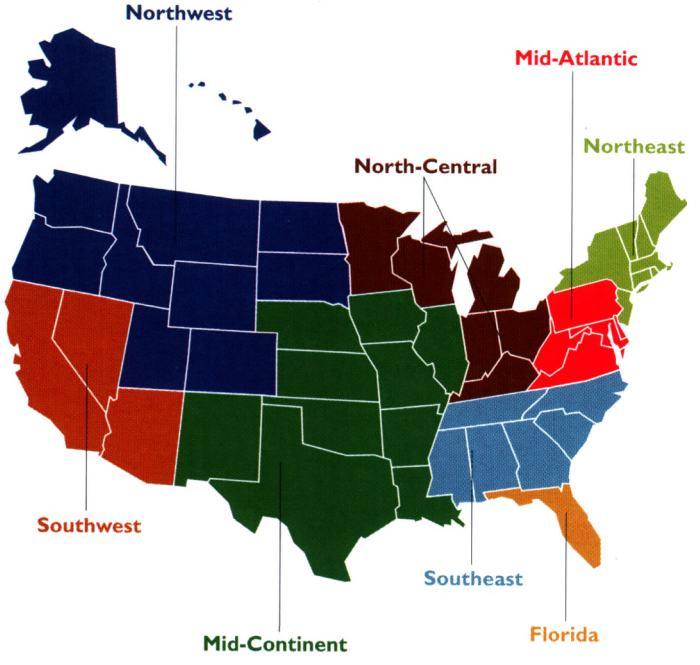

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Subscriptions $18 a year, Canada/Mexico $21 a year, and international $33 a year (air mail).

Subscriptions, articles, photographs, and correspondence relevant to published material should be addressed to: United States Golf Association, Green Section, Golf House, P.O. Box 708, Far Hills, NJ 07931.

GREEN SECTION RECORD (ISSN 0041-5502) is published six times a year in January, March, May, July, September, and November by the UNITED STATES GOLF ASSOCIATION®, Golf House, Far Hills, NJ 07931.

Postmaster: Address service requested — USGA Green Section Record, P.O. Box 708, Golf House, Far Hills, NJ 07931-0708.

Periodicals postage paid at Far Hills, NJ, and other locations. Office of Publication, Golf House, Far Hills, NJ 07931.

Printed on recycled paper

Turf *Twisters*

Q: My father has played at our home course for almost 60 years. He raised the question about why our superintendent doesn't pole the greens anymore. Is this still practiced by courses throughout our region? (Virginia)

A: Dew poles are still available for use and, in fact, are part of the standard operating procedures at many courses in the Mid-Atlantic Region. Many years ago, dew poles were used to remove dew and guttation water on mornings when the greens were not mowed. Maintenance practices evolve, and the use of this particular strategy is not very common today. Current course conditioning demands have led to daily mowing, but dew poles are still used to ensure that the surfaces are free of clippings and other debris. In this day and age, very few courses pole the greens daily to remove dew.

Q: The putting greens at our course were built in accordance with USGA recommendations about 15 years ago. The Tifdwarf bermudagrass base turf cover has now become heavily contaminated with off-types, and providing a consistent play and aesthetic character has become a major challenge. Renovation and converting to an ultradwarf bermuda are planned for this summer, but the question is, do we need to completely rebuild the greens? (Florida)

A: With proper construction and subsequent good management, USGA greens can perform satisfactorily for 25 to 30 years or much longer. Thus, it should be possible to conduct a strip-and-till regrassing process to address the turfgrass problems and convert to a new cultivar. It is recommended to submit two to four profile core samples to a physical soil testing laboratory for complete analysis. Along with making sure that no major structural problems exist, analysis of the rootzone mix is needed to determine the proper materials to add back and incorporate prior to replanting of the greens.

Q: Several sections of our golf course are covered with mud and standing water after a recent flood. What is the best way to go about fixing these areas? Will the mud or standing water cause long-term damage to the course? (California)

A: Often, getting onto the course immediately with heavy equipment for cleanup and repairs can cause more harm than good, so be patient. If possible, try to pump any standing water into nearby drains to allow the area to dry out. Don't be alarmed if some areas remain under water for several days. Fortunately, some turf species can tolerate submersion for an extended period. Damage is dependent on a number of factors, including the temperature of the water, light intensity, duration of submergence, and the tolerance of the particular turf species. In the case of mud or soil deposits, you should try to scrape the material off as soon as practical without damaging the area with heavy equipment or excessive traffic. The goal is to expose the turfgrass leaves so the plants can resume photosynthesis. Layers of mud and silt can cause long-term problems. Be prepared for multiple aeration treatments, especially on greens and tees, to break through any remaining mud layers.

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